



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,453	10/27/2003	Vladimir I. Gorokhovsky	AME-10/694,453T	2518
46271	7590	05/30/2006	EXAMINER	
JEAN KYLE P. O. BOX 2274 HAMILTON, MT 59840-4274			MCDONALD, RODNEY GLENN	
			ART UNIT	PAPER NUMBER

1753

DATE MAILED: 05/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/694,453	Applicant(s) GOROKHOVSKY, VLADIMIR I.	
	Examiner Rodney G. McDonald	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 27-72 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 27-72 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 1 and 27-72 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 1, 44 and 60 the term “deflecting-focusing conductors” is not present in Applicant’s specification.

In claims 1,44, 60, 66 the term “semi-cusp” is not present in Applicant’s specification and it is unclear where there is support for “semi-cusp”.

Claim 27 is unclear because it is unclear in the specification where the deflecting conductors are disposed at an upstream side of the cathode when the base claim has deflecting conductors disposed at a downstream of the cathode.

Claims 1 and 27-72 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, line 19, is indefinite because “near” lacks basis for comparison.

Claim 28, line 2, is indefinite because “near” lacks basis for comparison.

Claim 28, line 3 is indefinite because “downstream deflecting conductors” lack antecedent basis. The base claim has been amended to have “deflecting-focusing conductors downstream of the cathode”. It is unclear if this is what this refers to.

Art Unit: 1753

Claim 38, line 2, is indefinite because "near" lacks basis for comparison.

Claim 40, line 2, is indefinite because "near" lacks basis for comparison.

Claim 44, line 18, is indefinite because "near" lacks basis for comparison.

Claim 44, line 21, is indefinite because the use of the word "cathode" is unclear.

Should "cathode" be replaced by "metal vapor source"?

Claim 60, line 9, is indefinite because "near" lacks basis for comparison.

Claim 61, line 2, is indefinite because "near" lacks basis for comparison.

Claim 64, line 2, is indefinite because "near" lacks basis for comparison.

Claim 66, lines 6 and 7, "the plasma source" lacks antecedent basis.

Claim 66, line 11, the use if the word "cathode" is unclear. Should "cathode" be replaced with "metal vapor plasma source"?

Claim 66, line 12, "the focusing and deflecting magnetic field overlapped" should be the "focusing and deflecting magnetic fields overlapping".

Claim 66, line 13, "near" lacks basis for comparison.

Claim 66, line 13, "the focusing magnetic field" lacks antecedent basis.

Claim Rejections - 35 USC § 102

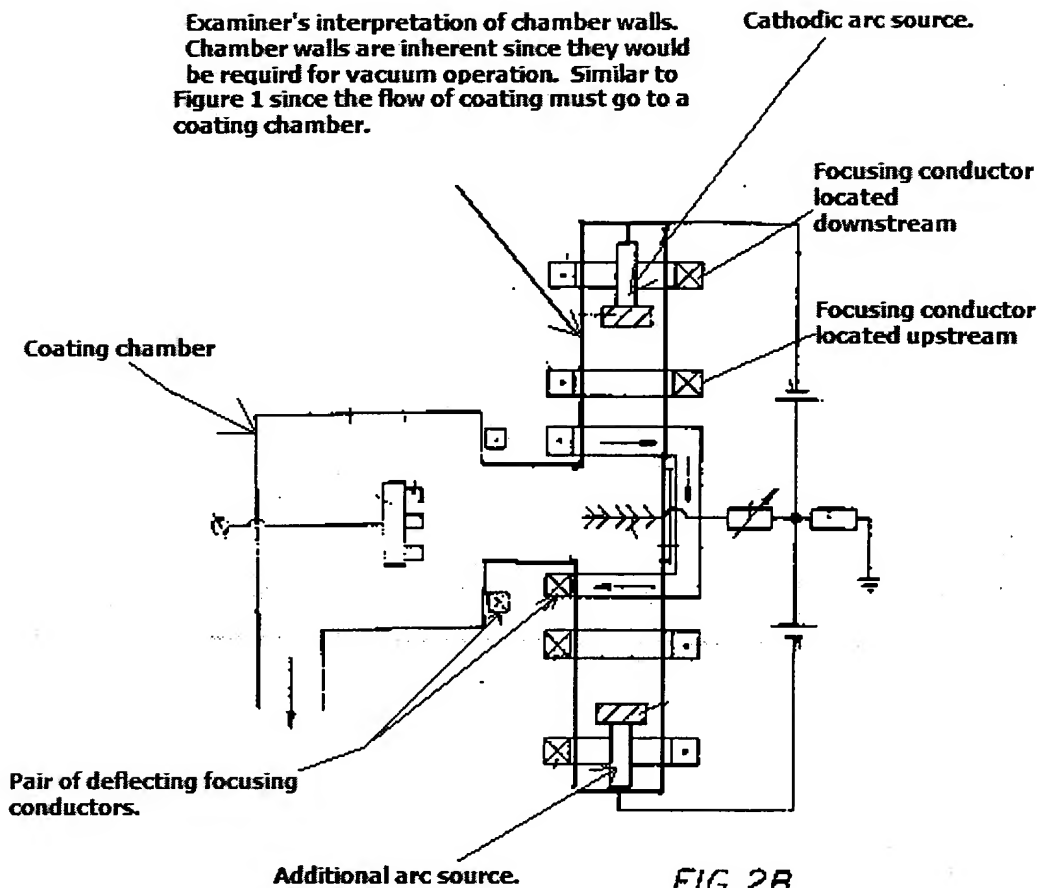
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 44, 45, 47, 66 and 67 are rejected under 35 U.S.C. 102(b) as being anticipated by Gorokhovsky (U.S. Pat. 5,435,900).

Regarding claim 44, Gorokhovsky teach an apparatus for the production of coatings in vacuum. (See Abstract) In fig. 1 Gorokhovsky teach at least one filtered arc source comprising at least one cathode 12 contained within a cathode chamber. The filter is element 9 with fins. (See Fig. 1) At least one anode 9 is associated with the cathode for generating an arc discharge. (See Fig. 1; Column 4 lines 3-6) A plasma duct 1 is in communication with the cathode chamber and with a coating chamber 3 containing a substrate holder 4 for mounting at least one substrate 5 to be coated the substrate holder 4 being position off an optical axis of the cathode 12. (See Fig. 1; Column 4 lines 1-3) At least one pair of focusing conductors 7, 8 is disposed adjacent to the cathode and the plasma duct, along upstream and downstream sides of the cathode, for focusing a plasma flow from the cathode to the plasma duct 9. (See Fig. 1; Column 3 lines 67-68; Column 4 line 1) Gorokhovsky teach a modification of Fig. 1 in Fig. 2B shown in the drawing below.



The chamber walls as understood by the Examiner would be located at the inside of the magnets similar to Fig. 1 and would lead to a coating chamber similar to Figure 1.

There is at least one pair of deflecting-focusing conductors 2, 15 disposed adjacent to the downstream side of the cathode and opposite sides of the plasma duct 9, generating a deflecting magnetic field for deflecting a plasma flow from the arc source into the plasma duct and a focusing magnetic field for focusing plasma flow along the plasma duct. (See Fig. 2B, Fig. 1; Column 4 lines 26-30) The deflecting field would inherently couple with the focus field to direct plasma. At least one metal vapor plasma source comprising material to be evaporated (labeled additional arc evaporation source

Art Unit: 1753

by the Examiner; The Examiner interprets that the metal vapor source includes a metal cathodic arc evaporation source.) comprises a material to be evaporated and is installed in the plasma duct "near" a converging area of the focusing magnetic field where the deflecting magnetic field is the smallest and is disposed off the optical axis of the chamber. (See Fig. 2B; Fig. 1; Column 4 lines 31-36) At least one pair of focusing conductors are disposed adjacent to the metal vapor source and the plasma duct on upstream and downstream side of the metal vapor source for focusing plasma flow from the metal vapor source to the plasma duct. (See Fig. 2B) Metal vapor propagates toward the substrate along magnetic field lines of the deflecting magnetic fields. (Column 4 lines 25-30)

Regarding claim 45, there is at least one metal vapor plasma source disposed in the coating chamber in opposition to the filtered arc source. (See Fig. 2B) Here the Examiner is interpreting that the at least one metal vapor plasma source covers a cathodic arc evaporation source.

Regarding claim 47, the at least one metal vapor plasma source is coupled to the cathode and disposed off an optical axis of the substrate holder. (See Fig. 2B)

Regarding claim 66, an arc can be generated to create a plasma of cathodic arc evaporate. (Column 5 lines 45-48) The additional source can be evaporated. (Column 4 lines 34-36) The metal vapor is ionized (i.e. a plasma) by the vacuum conditions and the potentials. (Example) A focusing magnetic field (Column 3 line 68) and deflecting magnetic acts to move material to the substrate. (Column 4 lines 25-30) The

Art Unit: 1753

simultaneous action of the two plasma sources causes mixing before the deposition.

(Column 4 lines 34-36)

Regarding claim 67, the at least one metal vapor plasma source is coupled to the cathode and disposed off an optical axis of the substrate holder. (See Fig. 2B)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 46, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gorokhovskiy (U.S. Pat. 5,435,900) in view of Ehrich (U.S. Pat. 5,662,741).

The difference between Gorokhovskiy and the present claims is that an electron beam for evaporating material is not discussed (Claim 46), the metal vapor plasma source comprising a heated evaporated cathode is not discussed (Claim 49), the metal vapor plasma source comprising a heated evaporated anode is not discussed (Claim 50) and utilizing at least one metal vapor plasma source disposed in a substrate chamber with the substrate holder is not discussed. (Claim 59)

Regarding claim 46, the evaporation source can be an electron beam source. (Column 4 lines 30-37)

Regarding claim 49, Ehrich teaches that the metal vapor plasma source comprises a heated evaporated cathode. (Column 4 lines 30-37)

Regarding claim 50, Ehrich teach that the metal vapor plasma source comprises a heated anode. (Column 3 lines 15-27)

Regarding claim 59, Ehrich teach that the metal vapor source can be placed in the substrate chamber with the substrate holder. (See Fig. 1)

The motivation for utilizing an electron beam for evaporating the material, utilizing a heated evaporated cathode, utilizing a metal vapor plasma source comprising a heated evaporated anode and disposing at least one metal vapor plasma source in the substrate chamber with the substrate holder because it allows for depositing layers at a reduced pressure with high ionization. (Column 1 lines 5-8)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Gorokhovsky by utilizing an electron beam for evaporating the material, utilizing a heated evaporated cathode, utilizing a metal vapor plasma source comprising a heated evaporated anode and disposing at least one metal vapor plasma source in the substrate chamber with the substrate holder as taught by Ehrich because it allows for depositing layers at a reduced pressure with high ionization.

Claims 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gorokhovsky (U.S. Pat. 5,435,900) in view of Bergmann (U.S. Pat. 4,877,505).

The difference between Gorokhovsky and the present claims is that the sputter deposition plasma source comprising a magnetron is not discussed. (Claim 51)

Regarding claim 51, Bergmann suggest utilizing a magnetic field for sputtering during arc discharge. (See Abstract)

The motivation for utilizing a magnetic field during sputtering is that it allows for producing coatings of greater density. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Gorokhovsky by utilizing a magnetic field during sputtering because it allows for producing coatings of greater density.

Claims 52, 53, 54, 55, 58 and 68-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gorokhovsky (U.S. Pat. 5,435,900) in view of Buhl (U.S. Pat. 4,929,321)

Gorokhovsky is discussed above and all is as applies above. (See Gorokhovsky discussed above)

The difference between Gorokhovsky and the present claims is that a deflecting and repelling anode is not discussed (Claim 52), the power supply connected between the deflecting or repelling anode and the cathode is not discussed (Claim 53), utilizing at least one grounded deflecting anode is not discussed (Claim 54), utilizing a power supply installed between ground and the repelling anode is not discussed (Claim 55), at least one cathode comprising a thermoionic cathode or a hollow cathode is not discussed (Claim 58), utilizing a thermionic cathode for ionization is not discussed (Claim 68), and utilizing the deflecting and repelling anodes is not discussed (claims 69-72).

Regarding claim 52, Buhl teach utilizing deflecting and repelling anodes for directing plasma streams toward the substrates. (Column 6 lines 32-42)

Regarding claims 53, 55, Buhl teach power source 15' connected between the deflecting or repelling anode and the cathode for arc evaporation. (See Fig. 1)

Regarding claim 54, Gorokhovsky recognize that the anode can be grounded. (Gorokhovsky Column 4 lines 63-65)

Regarding claim 58, Buhl recognize that the cathode can be a thermionic cathode. (Column 7 lines 60-63)

Regarding claim 68, Buhl recognize utilizing the thermoionic cathode for ionizing. (Column 8 lines 3-19)

Regarding claim 69-72, Buhl recognize utilizing the repelling and deflecting electrodes during deposition. (Column 6 lines 32-42)

The motivation for utilizing particular anodes and thermoionic cathodes is that it allows for coating large work areas. (Column 3 lines 25-31)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Gorokhovsky by utilizing particular anodes and thermoionic cathodes as taught by Buhl because it allows for coating large work areas.

Claims 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gorokhovsky in view of Buhl as applied to claims 52, 53, 54, 55 and 58 above, and further in view of Giersch et al. (U.S. Pat. 6,338,778).

The difference between Gorokhovsky and the present claims is that utilizing an impulse laser to ignite the arc discharge is not discussed (Claim 56).

Art Unit: 1753

Regarding claim 56, Giersch et al. teach utilizing a laser in order to ignite the cathode arc source. (Column 2 lines 55-60)

The motivation for utilizing a laser to ignite the cathode arc source is that it allows for ensuring the high operational safety of the cathode arc source. (Column 2 lines 59-60)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a laser to ignite the arc source as taught by Giersch et al. because it allows for ensuring operational safety of the cathode arc source.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-26 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 6,663,755 in view of Buhl (U.S. Pat. 4,929,321), Gorokhovskiy (U.S. Pat. 5,435,900),

Art Unit: 1753

Ehrich (U.S. Pat. 5,662,741), Giersch et al. (U.S. Pat. 6,338,778) and Klepper et al. (U.S. Pat. 6,495,002).

Claims 1-20 of U.S. Pat. No. 6,663,755 teaches the elements of Applicant's claims.

The differences between claims 1-20 of U.S. pat. 6,663,755 and the present claims is that at least one metal vapor plasma source disposed off an optical axis of the substrate is not discussed, the evaporator structures are not discussed, the sputtering means is not taught, the laser ignition means is not discussed, the nonconductive cathode is not discussed and the nonconductive target is not discussed.

Buhl discussed above teach a metal vapor plasma source disposed off the optical axis of the substrate. (See Buhl discussed above)

Gorokhovsky discussed above teach disposed the metal vapor plasma source off the optical axis of the substrate. (See Gorokhovsky discussed above)

Ehrich teach the evaporator structures. The sputtering means are suggested by the Ehrich discussion of using other vapor sources. (See Ehrich discussed above)

Giersch et al. teach utilizing a laser to ignite a cathode. (See Giersch et al. discussed above)

Klepper et al. teach utilizing a non-conductive target. (See Klepper et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified U.S. Pat. 6,663,755 by utilizing a metal vapor deposition source disposed off the optical axis as taught by Buhl and

Art Unit: 1753

Gorokhovsky, to have utilized an alternate vapor structure as taught by Ehrich, to have utilized a laser to ignite a cathode and to have utilized a non-conductive target as taught by Klepper et al. because it allows for coating large substrates.

Claims 1-26 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21-71 of copending Application No. 10/713,529 in view of Buhl (U.S. Pat. 4,929,321), Gorokhovsky (U.S. Pat. 5,435,900), Ehrich (U.S. Pat. 5,662,741), Giersch et al. (U.S. Pat. 6,338,778) and Klepper et al. (U.S. Pat. 6,495,002).

Claims 21-71 of U.S. Pat. No. 6,663,755 teach the elements of Applicant's claims.

The differences between claims 1-20 of U.S. pat. 6,663,755 and the present claims is that at least one metal vapor plasma source disposed off an optical axis of the substrate is not discussed, the evaporator structures are not discussed, the sputtering means is not taught, the laser ignition means is not discussed, the nonconductive cathode is not discussed and the nonconductive target is not discussed.

Buhl discussed above teach a metal vapor plasma source disposed off the optical axis of the substrate. (See Buhl discussed above)

Gorokhovsky discussed above teach disposed the metal vapor plasma source off the optical axis of the substrate. (See Gorokhovsky discussed above)

Ehrich teach the evaporator structures. The sputtering means are suggested by the Ehrich discussion of using other vapor sources. (See Ehrich discussed above)

Giersch et al. teach utilizing a laser to ignite a cathode. (See Giersch et al. discussed above)

Klepper et al. teach utilizing a non-conductive target. (See Klepper et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified U.S. Pat. 6,663,755 by utilizing a metal vapor deposition source disposed off the optical axis as taught by Buhl and Gorokhovsky, to have utilized an alternate vapor structure as taught by Ehrich, to have utilized a laser to ignite a cathode and to have utilized a non-conductive target as taught by Klepper et al. because it allows for coating large substrates.

Response to Arguments

Applicant's arguments filed 3-20-06 have been fully considered.

In response to the argument that the prior art does not teach utilizing any other type of metal vapor source operating together with a conventional cathodic arc source as is claimed, it is argued that as the claims are written the "at least one metal vapor deposition plasma source" would read on an additional cathodic arc evaporation source which both Buhl and Gorokhovsky suggest. Looking at Claims 1 and 60 and those dependent thereon it appears that Buhl and Gorokhovsky do not teach locating the additional metal vapor plasma source directly "in the plasma duct" utilizing the magnetic field configuration set forth by Applicant. Looking at Claims 44 and 66 and those claims dependent thereon it appears that Buhl and Gorokhovsky do teach locating the additional metal vapor plasma source off the optical axis of the substrate and therefore this is

Art Unit: 1753

believed to suggest Applicant's claimed subject matter in these claims. The Examiner has provided new rejections rejecting the claims because of the interpretation that "the metal vapor plasma source" can be a "cathodic arc evaporation source".

In response to the argument that the prior art does not teach merging two or more plasma flows some being filtered and some being unfiltered, it is argued that the claims as written could include that all the flows be filtered. This would include the metal plasma vapor source. The claims do not include language that limits them to a mixed flow of filtered and non-filtered flow.

In response to the argument that the prior art does not teach deflecting conductors and deflecting-focusing conductors for deflecting a flow of the plasma toward the substrate holder, it is argued that both Gorokhovskiy and Buhl suggest providing magnetic fields to deflect plasma toward the substrate (i.e. deflecting) and away from the walls of the duct (i.e. focusing). (See Gorokhovskiy and Buhl discussed above)

The double patenting rejections are maintained because it is believed that the subject matter is taught including the deflecting magnets.

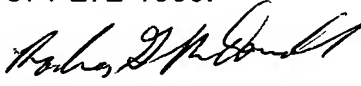
It should be noted that the "deflecting-focusing conductors" were rejected under 35 U.S.C. 112 1st paragraph because applicant's specification did not refer to "deflecting-focusing" conductors. Applicant's specification refers either to focusing conductors or deflecting conductors. It is suggested that if there is support for the "deflecting-focusing conductors" that it be pointed by page and line number.

This action will be made NON-final based on the new rejections made and for the further reasoning made by the Examiner.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
May 24, 2006